GrummanWorld

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Heavy Hitters. *Cliff Muzante beats up on metals as drop hammer operator in Building 2 in Bethpage. The large drop hammer suspends a die that can weigh three to five tons above a sheet of metal. Air pressure then slams the weight down, forcing the metal to take shape between the top and bottom dies. For example, this sheet of aluminum is being worked into the shape of an F-14 fuselage skin. First it is hammered, then heat treated in a 900 degree salt solution, and then formed again. Some metals may have to be hammered 10 times or more before they have the required final shape and thickness. (Photo by Bob Settles)*

Verzera Is Named Top Suggester Of '86

On Wednesday, March 11, a dozen Grummanites were honored at the 21st annual Project Sterling Awards Dinner at the Milleridge Cottage in Jericho, Long Island.

The top suggesters won supplementary awards in addition to the monetary prizes they earned when their ideas were first approved. For the first time, the 1986 awards were being made in Grumman shares instead of cash.

Top suggester of 1986 was Bob Verzera of the Corporate Services Division in Bethpage's Building 30. Verzera, who works in Central Procurement, received 100 Grumman shares.

He proposed a new way of making a C-2A diagonal brace assembly longer, which saved the company $85,927 and netted him an initial Project Sterling award of $6,595. Verzera was a major assemblies buyer at the time he made his winning suggestion, and is now purchasing manager of machined parts.

In second place was Michael Redding, a technician for Corporate Services' Facilities Maintenance in Building 30, Bethpage. Redding's idea saved Grumman $13,585 and initially earned him $1,350. He received 50 Grumman shares.

Third-place winner was Thomas Jones, a leadworker in the Aircraft Systems Division's Stretch Wrap department in Building 3, Bethpage. The calculated savings to Grumman was $20,834; Jones' initial award was $1,886. At the dinner, he received 30 Grumman shares.

These four Grummanites placed fourth and received 20 Grumman shares each:

George Boyle, processor/welder in Electron Beam Welding, Building 2, Aircraft Systems.

Leroy Mowbray, senior operator in Router Machining, Building 3, Aircraft Systems.

Frank DeMaio, group leader in Integrated Logistics Support, Building 4, Aircraft Systems.

Niel Napolitano, group leader for Budgets at Great River, Electronics Systems Division.

They each received 20 shares.

Six Grummanites from Aircraft Systems were fifth place winners. Engineer Lawrence Rodenbough and technician Philip Bruckner from Building 12's Measurement Standards lab had a joint suggestion and received five shares apiece. The other winners were Roy Charletta, an engineer in Aero Test, Building 5; John Gwynne, a project pilot in Flight Test at Calverton; and Gunter Mannerz, material manager at Calverton. They each received 10 Grumman shares.

Forty Grummanites were named Project Sterling Super Savers for 1986 and received 10 Grumman shares each.

The March 27 issue of *Grumman World* will feature additional coverage of the Project Sterling awards dinner.■

Big Rms, Runway Vu. *The A-6F, F-14D and modification programs were causing an aircraft housing shortage at the Calverton, Long Island, facility. But these two new 125-foot square hangars which opened in mid-February have enough room for four aircraft. (Photo by Gerry Costello)*

What's Inside

EIP Annual Meeting Set For April 2 - Pg. 2

Hawkeye Joins The Coast Guard - Pg. 2

Detroit's Big Three Take Plane Approach To Auto Safety - Pg. 4

An Interview With International President Rolf Larson - Pg. 5

Publications Supplies The Answers - Pg. 6

Employee Investment Plan Members Invited To April 2 Annual Meeting

The annual meeting of the Grumman Employee Investment Plan takes place Thursday, April 2. All plan members are invited to attend the meeting, which starts at 5 p.m. in the Grumman Headquarters' auditorium.

Representatives of the firms that manage the Equity, Fixed Income and Guaranteed Income funds will be present, as well as representatives of the bank recordkeeper.

There will be reports on the performance of the plan's funds over the past year and projections of their future performance. Attendees will have the opportunity to ask the plan's managers questions.

So that a maximum number of inquiries may be answered, the Employee Investment Plan office suggests that you fill out the form on this page if there are certain topics you would like discussed. These suggestions are important — the evening's agenda is usually planned around them. Mail your inquiries to the Employee Investment Plan, C15-GHQ.

A summary of the meeting will be published in an upcoming issue of *Grumman World*.■

Investment Plan Inquiry

I'd like to have the following topic discussed: . . . . . .

. . . . . .

. . . . . .

Mail to: EIP, C15-GHQ

Drug Buster. *The U.S. Coast Guard's two new E-2C Hawkeyes will be used mainly to help patrol the Caribbean and stop marijuana and cocaine shipments from reaching the U.S.*

Coast Guard Enlists E-2C To Monitor Drug Traffic

Two Grumman E-2C Hawkeyes recently became full-time drug busters for the U.S. Coast Guard.

The Coast Guard's newly formed air interdiction squadron, now based in Norfolk, Virginia, will use the Hawkeyes for airborne radar surveillance. Eventually, the squadron will include 20 pilots and flight officers, and another 80 enlisted people.

After a two-year training program, the squadron will move to Clearwater, Florida. The E-2C's will be used mainly to help patrol the Caribbean and stop marijuana and cocaine shipments from reaching the U.S. The E-2C can detect airborne and surface targets 200 miles away. Pursuit aircraft will be directed by the E-2C's to chase detected smugglers.

The Customs Service also plans to obtain two Hawkeyes. These aircraft will be based in Corpus Christi, Texas, and will help monitor the U.S. border with Mexico.

Both agencies have been using the Hawkeye to monitor drug traffic since 1981. The E-2C has shown itself to be a powerful weapon against drugs coming in by air — tracking planes requires more sophisticated radar than needed to track boats.

In addition to combatting drug smugglers, the aircraft will help the Coast Guard in its maritime defense role — providing early warning radar in coastal areas.■

RAMP Project Moves Ahead

Groundbreaking ceremony held in South Carolina

On Monday, February 3, ground was broken in South Carolina for a development center that will help the Navy get spare parts in one-fifth the time it now takes.

The ceremony at the Charleston International Airport marks the beginning of the second phase of the rapid acquisition of manufactured parts (RAMP) project. RAMP is a joint venture of the Navy, the South Carolina Research Authority and a consortium of high technology companies, including Grumman's Data Systems Division.

Construction is now underway on three building modules to house manufacturing centers and offices for the consortium. The current 90-member team now works across from town hall in North Charleston. They will move to the new site in June 1988.

The RAMP site will house a complete computer-integrated manufacturing center capable of producing small mechanical parts and printed circuit assemblies at high speed. More importantly, the entire process from production initiation to delivery will be started and controlled by electronic commands, not by paperwork.

"So far the consortium has provided the Navy with the program master plan, all the support plans, functional specifications and estimated cost of the program," says program director Jim Austin of Grumman Data Systems. "There are now negotiations between the Navy and the South Carolina Research Authority based on the scope of the program and the design we have given them."

Data Systems is responsible for software engineering, selection of computer hardware and the network needed to keep data moving. That amounts to more than a third of the work on this project. There are now 20 Grummanites working on the project, but the team will grow as this second phase gets off the ground.

The Navy envisions RAMP as the prototype for a manufacturing facility that can deliver a part 60 days after it is ordered. It now takes an average of 300 days. By delivering parts to the fleet faster, such a system will boost fleet readiness.■

New Assignments

Responsibilities within the Services Division have been re-established.

The following departments report directly to Grumman President John O'Brien: Business Operations, led by Services Vice President Jake Bussolini; Legal, led by Grumman Corporation Vice President and General Counsel Tom Genovese; and Corporate Procurement, led by Services Vice President Bob Simon. In addition, Facilities Engineering, directed by Tom Cunniffe, and Facilities Maintenance, directed by George Turney, report to Bussolini.

The following Services departments report directly to Grumman Corporation Secretary and Vice President Bob Bradshaw: Personnel, directed by Bob Foster; Administrative Services, directed by Art Leach; and Security and Transportation, directed by Harry Volz.

Dan Knowles has been appointed Services vice president of Human Resources Planning.

Dear John Doe, We'd Like To Help, But...

There have been quite a few letters in *Grumman World*'s mailbox in the past few weeks. We are grateful for all comments, complaints and inquiries, and we publish the ones of general interest. For those letters of not-so-general interest, we still obtain a response from the person most qualified to answer, and forward that information to the letter writer. However, a lot of our letters are unsigned — and that is most frustrating.

One writer said that he is underpaid, unappreciated, and has no reason to hope that things will change. His comments are vague, such as, "The company is not fair to the workers," and point to a need for him to sit down with his supervisor or someone from Personnel and clear the air. If he had been more specific about his complaints, perhaps someone could help. But without a name or a mail stop, there's nothing we can do — and he's probably angry at us for not printing his letter.

One writer had a very definite complaint about pay inequity, and says his boss agrees that the situation is unfair. He didn't sign his name because, "I was told to be quiet." Maybe an anonymous letter helped him let off some steam, but it won't solve his problem.

Someone else wrote in with some good suggestions about filling out paperwork. However, there were other things in the letter that we didn't understand, and we can't call him or her for clarification because the letter was unsigned. We also would have suggested that the person submit the ideas to Project Sterling.

Grumman World will certainly withhold your name at your request. It should also be noted that before we send a letter out for response, we retype it and delete the name to protect the employee's anonymity.

But letters must be signed in order to be printed or to receive a response. And if you recognize your letter in any of the examples given here, give us a call: we want to help.

View Of Fin Land. *Assembler-riveters Vern Turple (L) and Tony Kuefner go to work on some of the wings and vertical stabilizers being rebuilt under the F-14 Block 60/65 update program. Here in the Surfaces department in Building 3 they tear down each unit, fix up fins or send wings out for rework, have the parts painted, then reassemble the units and ship them to Calverton. So far, 16 wings and 12 stabilizers have been refurbished. Grumman is updating 25 Tomcats for the Naval Air Reserve in Texas. (Photo by Rich Breunig)*

New Electronic Warfare Lab To Hit The Road

Aircraft Systems will develop and test new jammers and modulations in a specially equipped mobile trailer. Modified by the Grumman Houston of the Electronics Systems Division, the trailer is now being stuffed with electronic hardware in Bethpage.

"It's an engineering tool that we need to stay in the running for several major electronic warfare (EW) programs," says Wally Zepf, manager of Advanced Electronic Warfare in Aircraft Systems' Advanced Systems.

Grumman has invested about $1 million to design and build this mobile lab, along with the new EW hardware being installed in it.

The trailer is now being outfitted with a newly developed jamming transmitter/antenna system designed by Zepf's group. Their system will have applications for a number of programs, including an Army EW effort that Grumman has been pursuing for several years and some new Air Force work.

The mobile lab is based on a 8-foot high, 8-foot wide, 40-foot long Grumman Dormavac. Dormavac was a container system to transport fresh foods and other perishables under low pressure that Grumman tried to market several years ago. "Its double-walled aluminum construction is perfect for radio-frequency shielding," says Zepf. It will be completely self-contained, having its own generator and temperature controls.

This is Grumman's second EW mobile lab. Its first one was built in the mid-70s. That lab played a part in the development of several generations of the EA-6B, including the Advanced Capability Prowler which the Navy will have in the '90s, and the EF-111. The container section of the original lab just wore out.

Replacing the old lab offered the opportunity to build a bigger one. The new mobile lab is twice as long as its predecessor, though just as mobile. For example, when it must be moved from Calverton to Eglin Air Force Base in Florida, it will be trucked on a flatbed 18-wheeler.

Once all the electronic equipment is installed, the mobile lab will be tested at the EW range in Calverton and then put to work at military ranges later this year.■

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Reduction In Force Begins On Long Island

Company must reduce L.I. work force by 1,500

In mid-January, Grumman announced that its Long Island work force must be reduced by 1,500 jobs. Approximately 300 jobs will be vacated by attrition.

The reduction in force began Thursday, February 26, when 60 employees were terminated. The layoffs are expected to be completed by the end of April.

"A reduction in force means that an employee must be terminated because of lack of work or lack of funding, not because of poor performance," says Bob Foster, director of Personnel.

According to Foster, the majority of the cutbacks are expected to take place in Aircraft Systems — specifically Product Operations and Technical Operations. Product Operations includes Calverton Operations, Material Management and Manufacturing; areas affected in Technical Operations are engineering and support groups.

To a lesser extent, Data Systems and Corporate Services will also be affected. Little impact will be felt in Aerostructures and Electronics Systems.

Although the list hasn't been completed yet, a significant number of job shoppers are expected to be terminated, says Foster. The company hires these temporary employees through temporary help agencies. Positions filled by job shoppers range from secretary to aircraft mechanic to software engineer.

Out of the total Grumman work force about 1,400 or four percent are job shoppers. So far, about 200 of these positions have been eliminated; more are expected.

"Many steps must be completed in each department before Grummanites are told that their jobs have been eliminated," says Foster. "Each candidate for reduction in force is reviewed by the Corporate Termination Review Board before any termination action is taken."

All Grummanites whose jobs are terminated have the right to appeal; they should call Personnel Relations, Ext. (111) 54357.

"Nobody likes to be told that he no longer has a job," adds Foster. "Special counseling and assistance in finding a job are available to everyone."

Grumman people affected by the reduction in force will receive severance pay based on their years of company service. Assistance offered by the Personnel Department will include preferential consideration for openings at other Grumman locations, job referral service to other Long Island companies, job counseling, resume preparation and other services. A one-day outplacement seminar is also being offered.

Upon termination, each employee receives a packet which includes medical and life insurance information, a question-and-answer pamphlet, and a record of employment form which is required when filing for unemployment insurance. A list of Grumman Personnel telephone numbers is also included.

Grumman hospital, surgical and major medical plans are extended to employees and their dependents for 30 days after the termination date providing that the employee is not employed elsewhere or does not have insurance coverage through any other source. Grumman life insurance remains in effect for 31 days beyond the date of termination. Terminated employees may continue both their medical and life insurance by paying the premiums themselves.

New York State unemployment benefits are approximately 50 percent of a person's pay, but a maximum of $180 per week.

Since the January announcement was made, all job postings and transfers have been frozen. This is expected to continue until the complete list of the people affected by the reduction in force is finalized. However, there are critical needs in certain areas, and this might necessitate the freeze being gradually lifted in specific areas later this year.■

Retirees

On behalf of our fellow workers, Grumman World salutes the following Grummanites for their contributions to the company and wishes them will in their retirement. Those who have recently retired are:

Blair A. Reinard (2), Alexandra Sokol (2), Robert L. DeVine (5), Stanley J. Laskowski (14), Richard W. Anson (5), Gloria H. Meinecke (5), Donald H. Lord (106), Charles Walthers (289), Stephen Golego (14), John Daus (18), Hercules Sims Jr.(2), Harold R. Sanders (55), William C. Epling Jr. (77), Richard W. Hoens (77), Albert L. Crevoiserat (1), Charles M. Beagan (4), Edward J. Stero (110), Frances Gargiulo (35), George E. Brightman (43), William R. Klatt (1), Howard J. Jacobsen (2), Harold E. Philcox (6), Tomasi Izzo (55), Charles Petri (3), Lillian D. Fink (30), Harold J. Cosgrove (3), Victor Vohwinkel (110), Arthur Minardi (7), Arthur J. Ploessel (5), Nickolaus J. Haus Jr.,(1), Joseph F. Callahan (9), Gurden Haber (5), Philip Bennett (5), Robert O. Barkman (56), Anselmo Loffredo (2), Robert S. Clarke (14), John A. Ferguson (43), Irene E. Quinn (30), Bernard Shansky (55), Robert E. Griffith (2).

Next Edition: March 27

Detroit's Big Three Take Plane Approach To Auto Safety

Demolition Derby Champs. *(From L) Patricia Ogilvie of Data Systems and Bob Winter and Allan Pifko of the Corporate Research Center have made the wrecking of car and aircraft designs a science. (Photo by Bob Settles)*

When it comes to designing safer cars, Detroit's "Big Three" gets help from three Grummanites in Bethpage.

The three members of Grumman's Corporate Research Center in Bethpage work on a computer program called DYCAST/GC. DYCAST, an acronym for Dynamic Crash Analysis of Structures, simulates the reaction of a structure to an impact, or predicts the collapse of a structure under too heavy a load. Grumman uses it to simulate aircraft crashes and to analyze wing collapse. For the auto industry, it speeds the design process and reduces the tremendous cost involved in producing crash worthy cars.

Chrysler Corporation recently signed its fourth one-year lease of the DYCAST/GC program. Ford Motor Company has been leasing it since 1981 and General Motors had Grumman use it in Bethpage for one particular project.

"It saves the industry 50 to 100 thousand dollars for every crash test it can eliminate," says Bob Winter, senior staff scientist, who's on the DYCAST team with Data Systems' software engineering analyst Patricia Ogilvie and Corporate Research Center senior staff scientist Allen Pifko in Building 35.

The DYCAST software is a set of finite element analysis codes — about 50,000 lines of code. It not only cranks out a trunkful of raw data for automotive engineers to analyze, but, with the use of graphics packages, allows them to watch the simulated crash.

They can drive their string-art-like electronic "car" into an electronic "wall" and view the result in slow motion to see how the subassemblies bend and crush to absorb the forces. Color-coding the subassemblies makes it easier to see how they react.

To get to where engineers can simulate an auto or aircraft crash on computer monitor takes time. Drawings must be converted to finite elements, like cutting a high-tech jigsaw puzzle. This can be done manually or automatically with a computer program called a mesh generator.

The computer must be given the dimensions of the structure and all the parts, the properties of the materials used and the way the parts are joined, and all the criteria of the test. Only then can the complicated calculating begin.

It takes an hour or two of number crunching on a customer's Cray supercomputer — more on a conventional computers — to simulate the impact of a front or rear end collision that on the street takes little more than a tenth of a second.

The calculations are done incrementally. For a simulated rear-ender, the computer "hits" the mathematical bumper with a rigid "object." Then, for each thin slice of time, it calculates how much of the energy each finite element initially absorbs, how much the elements bend or crush, how much energy is passed to other parts, how much energy each of their little elements absorbs, how much energy is left, then goes through it all again and again.

The calculations are done this way because a fender-bender is non-linear. As the metal bends during each split second of a crash, the structure changes. The physical changes in the metal change the numbers being plugged into the formulas for each slice of time. Non-linear calculations are expensive arithmetic.

But the result is worth the expense. DYCAST/GC lets engineers hone their new car design's structure before their company sinks a huge investment into a real car. Crash test cars are often handmade and can cost $300,000 to build.

According to Winter, Grumman first looked into the application of non-linear finite element analysis in the late '60s. DYCAST itself came along in the '70s.

"We initially developed the program here for analysis of wings and other aircraft structures," he says. "Our first outside contract was from the Army on a Bell Helicopter program."

It was a small-scale effort initially. Then, a few years ago, Grumman got a second contract to do crash analysis on an all-composite helicopter design, the predecessor of the ACAP program.

DYCAST is strictly an internal-use program; DYCAST/GC is the version Grumman leases. The initial effort took DYCAST, an overall computer program to aid in the crash worthiness design of helicopters and other aircraft, out of the theoretical world of research and into the real world.

Grumman's first contact with the automotive industry occurred in 1978.

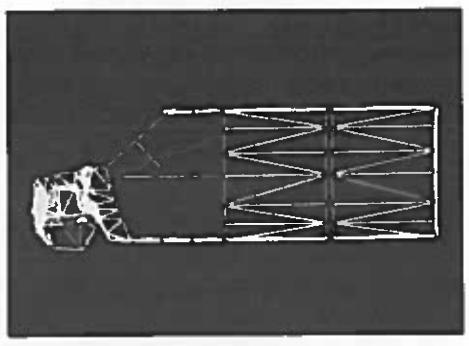
"We did a private study with Ford, researching the whole question of whether this kind of software product could be used for automotive crash analysis," says Winter. Ford became the first customer to lease DYCAST/GC.

Grumman performed analyses on the short-lived DeLorean sports car. A more successful product, General Motors' 1984 Corvette design, was put through the crash worthiness wringer here in Bethpage. "These two contracts gave us some tough, practical problems to try the program on at a critical stage in its development," says Winter. 1984 was also the first year that Chrysler leased DYCAST/GC.

Grumman International is looking into marketing DYCAST/GC to automobile manufacturers in Japan in the hope that it will interest them in some of Grumman's other capabilities. Besides, it's an effective way to get additional mileage out of a home-grown program that has been used to solve aerospace problems.

For example, NASA has used it for several programs, including a well-publicized test in 1984. NASA and the FAA wanted to study passenger survivability and the effectiveness of an anti-misting fuel in the crash of an airliner. DYCAST was used to configure the way the Boeing 720 test article would hit the ground.

Efforts are under way to make the program work for aircraft battle damage analysis, which is related to auto crash analysis but more difficult to do.■



Bang-up Jobs. *Putting a car through a crash test, as Ford did this Escort in 1981 (at L), is an expensive proposition. Grumman's DYCAST/GC program helps minimze the number of tests needed to prove a design's safety. Chrysler (above) use the program to simulate a front end collision on its Voyager minivan design.*

An Interview With Grumman International President Rolf Larson

'While The Domestic Market Has Been Rather Stable, The International Market Is Expanding'

As part of its continuing series of interviews with top company officials, Grumman World *recently talked with Grumman International President Rolf Larson. Grumman International's home base is corporate headquarters in Bethpage, Long Island. A wholly-owned subsidiary of Grumman Corporation, it has offices in five countries.*

Grumman World: *What role does Grumman International play at Grumman?*
Larson: Our goal is to provide a new corporate growth via international market. While our primary mission is to sell Grumman's product line overseas, in recent years we've expanded our scope to include other international ventures.

GW: *What Grumman product has been International's biggest seller?*
RL: Undoubtedly, it's been the E-2C Hawkeye. We've sold the airborne early warning aircraft to Israel, Japan, Egypt and Singapore. Due to U.S. government regulations, it is the only one of Grumman's current military products that we are allowed to market overseas.

'AEW competition has really heated up in recent years'

AEW competition has really heated up in recent years. There are places where we encounter all-out competition as we did in the United Kingdom last year. The British eventually selected the Boeing AWACS. However, some countries can be clearly identified as E-2C markets; others are best served by AWACS. You get into street fights in the grey areas — where both can do the job.

GW: *Are any other countries interested in the Hawkeye?*
RL: In 1986, senior military officers from Malaysia and Thailand visited Bethpage for an E-2C familiarization course. Early in 1987, 10 senior officers from Pakistan also took the course, which includes lectures, lab visits and flights.

Remember that AEW is a new military capability for many countries. Traditionally, they have fighters and bombers in their air forces. So, many times we must demonstrate to them how their countries' defenses would benefit from AEW. Requirements must be developed in-country. Attending the familiarization course is just one more step in a long, slow process.

GW: *How long does it take between initial contact with a country and an actual sale?*
RL: As a whole, patience is a key in international business. Every country operates in a different time dimension; economic and political factors are involved. Some countries might purchase Grumman products with the U.S. Foreign Military Sales (FMS) program dollars, while other countries have developed economically so they can pay for the product with their own dollars. All in all it takes about three to five years.

GW: *How does the market for renovating and upgrading of older aircraft look?*
RL: New weapons systems cost large amounts of money. For many countries, updating their existing aircraft is the most economical way to go. The market is definitely there.

One such plane is the S-2 anti-submarine-warfare (ASW) Tracker, which is used by many Third World countries. Well over 100 are still in operation worldwide. For instance, Korea, Thailand and Turkey are interested in converting their existing Trackers to S-2T's with turbo props. The work would also involve modernizing the plane's electronic systems. We have the technology to adapt the S-2T for a variety of missions.

GW: *What about Grumman's recently signed contract with the government of Pakistan?*
RL: The Sabre II is a special program: three countries with different ideologies and cultures are working together.

We are studying the technical feasibility of integrating U.S. engines and avionics into a Chinese-built fighter for the government of Pakistan.

We are working with Chengdu Aircraft Corporation of China. After our study is completed, Pakistan will compare the cost and capabilities of Sabre II to other available fighters. However, I believe the cost of modern fighters will be much greater than the Sabre II.

There are other incentives for the Pakistanis to go with the Sabre II. Some portion of the upgrade would be done in their country, so they would pick up manufacturing and technical capabilities they don't have today.

This program has the potential to be the turning point for Grumman International and the corporation as a whole. Redesigning and upgrading 150 planes would be worth about a half billion dollars.

'For many countries, updating their existing aircraft is the most economical way to go.'

GW: *How about commercial ventures?*
RL: Our commercial programs continue to offer Grumman excellent opportunities for international joint ventures.

Last year, we sold fire trucks to the People's Republic of China, Mexico, the Dominican Republic and Saudi Arabia to name a few. We also sold Kurbmaster kits to Japan.

Right now, we are working on a feasibility study to co-produce fire trucks in the People's Republic of China. It is an exciting project: Grumman would team with suppliers from England, Finland and Holland and the fire trucks would be built in China.

At present, China builds 2,000 fire vehicles a year. The Chinese are interested in updating the technology and manufacturing methods which are both reminiscent of the post-WWII era. In addition, they also want to broaden their product line — especially with aerial platform ladder trucks. These trucks are in special demand because of China's building boom. There aren't enough aerials to cover fires in the many new city high-rise apartment buildings and offices now being erected.

Indonesia is another potentially large market for fire trucks. In 1986, Grumman Emergency Products granted a license to P.T. Amalgam, a producer of autos and buses in Jakarta, to build Grumman fire trucks in Indonesia. This firm is beginning to penetrate the market in that country. Unfortunately, the Indonesian economy has slowed due to the drop in oil prices and a drop in tin commodities.

Grumman Olson Kurbmasters are now being sold in the U.S. with chassis built by Isuzu of Japan. In turn, Isuzu is testing the market for Kurbmasters in Japan. Even though it appears that this market has been stymied due to the yen appreciation, we believe that Kurbmaster has a good market in Japan.

GW: *What are other areas being pursued?*
RL: In the near future, Grumman will establish a fire truck repair and maintenance workshop in Riyadh, Saudi Arabia, and train Saudi civil defense personnel. The project would be handled by Grumman Technical Services. We hope to expand this work into other cities in the region.

GW: *What about offsets in international sales?*
RL: Because of the great expense of acquiring defense equipment and the keen competition, buyer countries have discovered that they can make demands of the seller for additional considerations. Generally called offsets, these considerations can be performing subcontract work in the buyer country, purchasing the country's products for resale elsewhere, giving the buyer country training, or transferring certain technological capabilities.

Currently, Grumman has three offset commitments: Israel (Lavi wing), Singapore (E-2C) and Korea (S-2).

Offsets are a way of life that we must get used to if we want to do business internationally. However, the bright side is that you can discover a number of profitable business opportunities through offsets. This is why we think of offsets as an opportunity, not a problem.

GW: *How many people work in Grumman International?*
RL: We have 49 people working out of corporate headquarters and at five overseas locations: Singapore, Japan, Israel, Paris and Thailand. We also have in-country consultants in Latin America and Taiwan.

It takes a special breed to work in GII. You have to know the country along with U.S. government policies and procedures. You must become familiar with the culture, language and the various ways of doing business in foreign countries.

We are the first contact foreign customers have with Grumman. First impressions definitely count. We are the image-carriers for Grumman. Success or failure is dictated to a large measure by that first impression.

'We have the technology to adapt the S-2T for a variety of missions'

GW: *What are the major challenges facing Grumman International in 1987?*
RL: We'd like to see many of our feasibility study programs reach fruition, such as the Chinese fire truck joint venture and the Saudi Arabian civil defense program. If we do our job right, I'd like to see us move to the second stage for the full scale development of the Sabre II. We will continue to work on sales of the E-2C to Pakistan and Japan and to secure other customers for the S-2T.

Inside the company, we must continue to spread the word that the international marketplace offers significant opportunities for growth. While the domestic market has been rather stable, the international market is expanding. We're out to internationalize Grumman. We've laid the ground work, but there is a lot more work to be done.■

How Do You Change A Flat Tire On An F-14? Grumman Publications Supplies The Answers

One of Grumman's most important products is held together by staples and glue: the technical manual.

For over 25 years, technical manuals have helped Grumman's customers obtain the most use and best service from a product. There are over half a million in print.

"Without these instructions, customers wouldn't know how to properly operate and maintain the equipment," says Bill Everett, director of Grumman's Publications department.

Publications' home base is Building 15 in Bethpage. There, about 400 technical writers, illustrators, editors, proofreaders, production, cost and data control and quality assurance people work closely with engineering and program management in translating highly technical information into plain English.

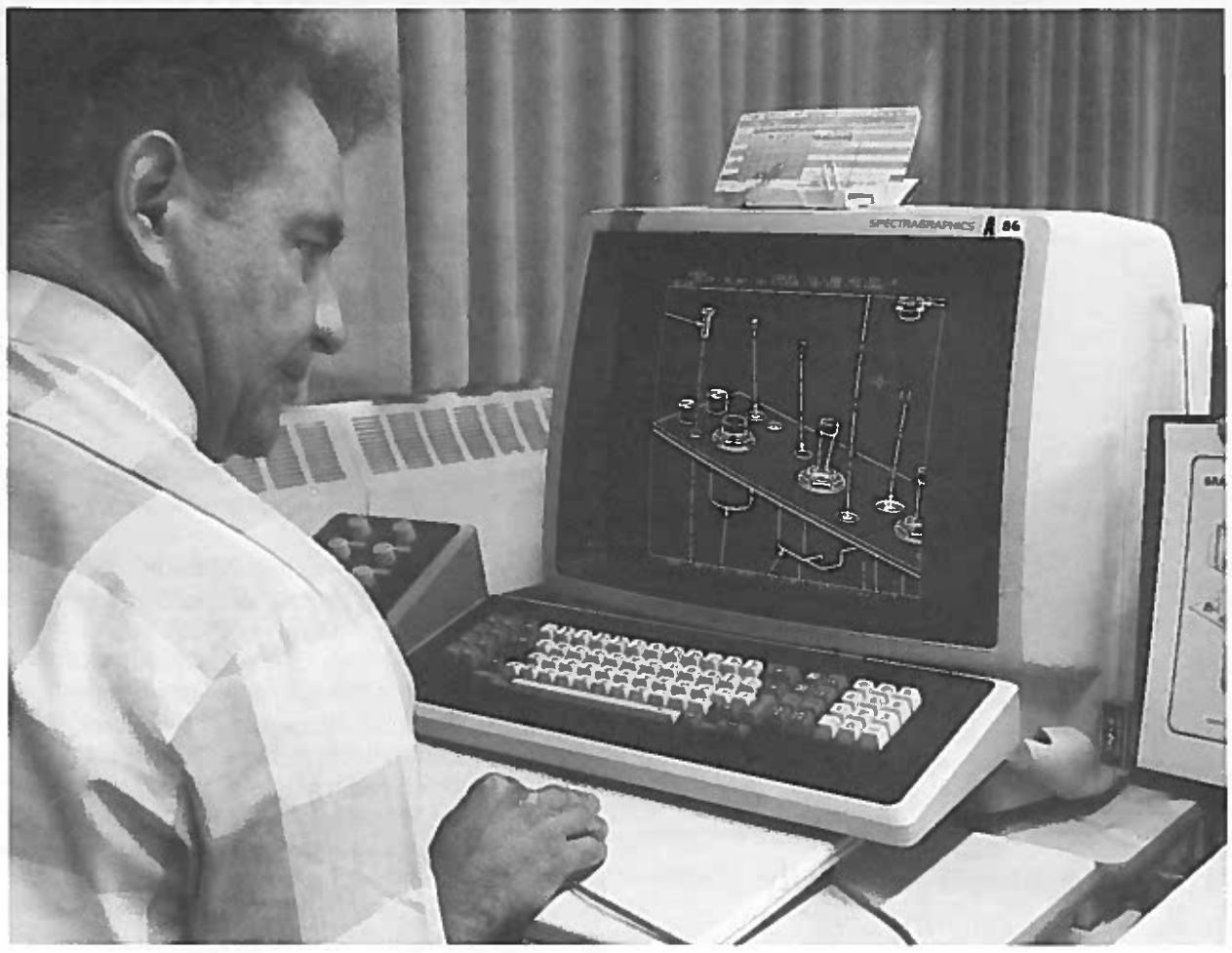
As part of Aircraft Systems' Integrated Logistics Support department, Publications produces manuals for the EA-6, EF-111, F-14, E-2, C-2 and A-6 aircraft, automatic test equipment, and other defense and commercial systems. Topics include flight, aircraft maintenance, structural repair, parts breakdowns, inspection requirements, and operating and service handbooks. Publications also supports other Grumman divisions preparing manuals for their products.

Technical manuals can take anywhere from 30 days to a year to complete, depending on the complexity of the equipment. For example, the upgraded F-14D and the A-6F aircraft will need new basic manuals and each will take about a year to complete. Changes and revisions will be made to these manuals for years to come.

In 1986, 1,474 editions of manuals were delivered — 135,842 pages in all.

Through research and consultation with engineers and technicians — the experts on the subject — technical writers must be able to interpret that knowledge for others in simple, accurate, and understandable terms.

Publications project management, technical writers and others are in constant touch with the customers. "Most of us have technical backgrounds and military service experience, which makes it easy for us to relate to our customer's needs," says technical writing specialist Dick Ward, who has 10 years of navigation experience with the Air Force. "What really counts is the ability to describe complex procedures in words that everyone can understand. Not all our customer's personnel have engineering or college degrees."



How Does It Go Together? *The computer-aided design and manufacturing (CADAM) system lets illustrator Joe Buscemi reach into the engineering data base and get the information needed to create illustrations. Publications has six CADAM terminals in Building 15. (Photos by Marie Trimborn and Rich Breunig)*

Technical illustrations can either be drawn manually or on computer aided design and manufacturing (CADAM) terminals. This is the same system that Grumman Aircraft Systems uses to design airplane parts. The Publications Department has six CADAM terminals connected to Engineering's computer base. Using CADAM, illustrators can call up engineering data in the computer and use it as is, or change it for use in the handbook.

Editors and proofreaders check the final manuscript to make sure the technical facts and grammar are correct. Quality assurance people also check the final product to make sure all the technical changes have been made, along with other tasks.

Graphic arts technicans manage the final handbook production process, from word processing to page makeup. "Our customers expect us to maintain our delivery schedules and they go over the copy with a fine-tooth comb," says Deasy. "There are many things we must keep track of and it can be frustrating, but when it finally does come together, it's a great feeling."

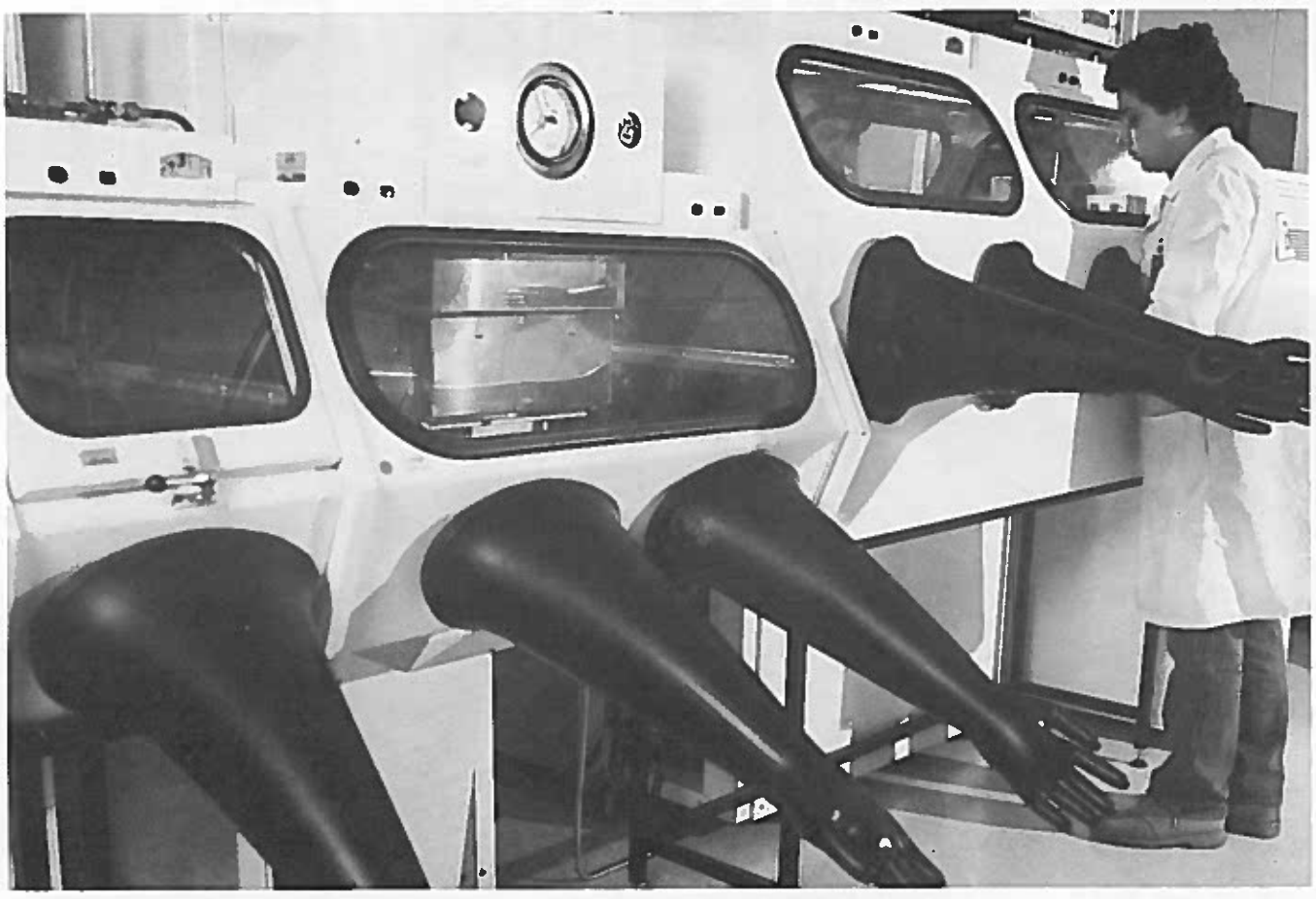
Most of the final manuscript is set on the Automated Text Management System. This computerized text processing and page-makeup system simplifies handbook changes and updates.

"The automated system has saved both Grumman and the customer time and money and improved our product and efficiency," says Mike McCormack, publications staff assistant. "By using standard formats for all manuals, we can duplicate portions of files, thus eliminating redundant keyboard typing."

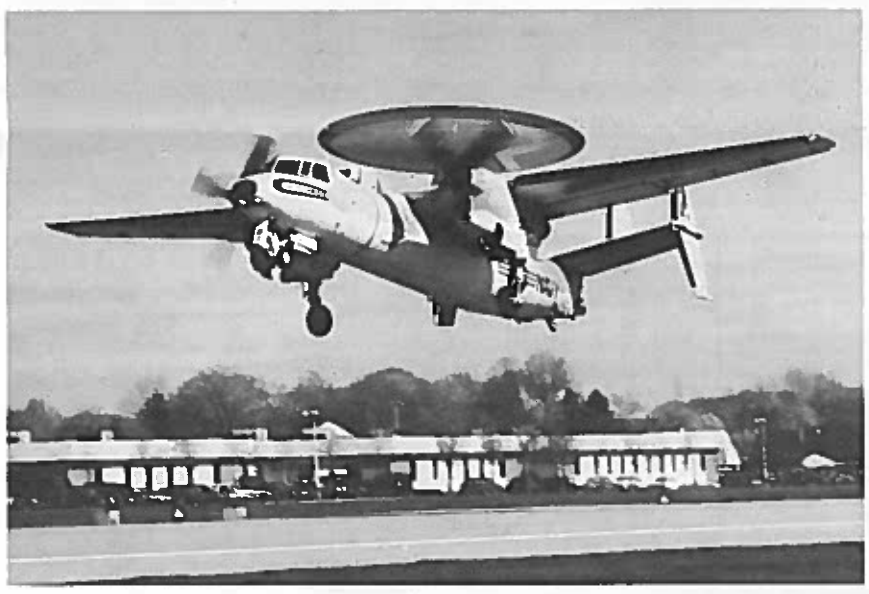
"In the near future, publications will be delivered electronically to our customers' central data base. That digitized data will be forwarded to all field sites in real time — thereby eliminating the need for paper copy," says Everett. "Automation certainly saves the customers time and money and helps us be more competitive for future publications work."■

Paper Products. *Electronic tools, such as the Automated Text Management System (above), are used by operator Dianne LaPorta (L) and word processing supervisor Evelyn Doherty to produce perfect manuals. Below, document processing group head Fred Cacace and graphic art technician Charlie Reger check a fold-out schematic diagram.*

Details, Details. *Illustrator Brian Johnson makes sure that the depiction of the F-14 cockpit display panels are perfect.*



They Want To Hold Your Hands. *Technicians such as Steve Cirone have their hands full in the Microelectronics Lab in Building 14 in Bethpage. Not only does the staff do research and development and prototype work on hybrid electronic circuits, but they also make production circuits, mostly for ground support equipment. Here, Cirone welds a hybrid circuit. The circuitry must be attached to the substrate — the base — in a sealed chamber. The gloves allow him to work on the circuits without contaminating the environment in the chamber. If the circuits were to come in contact with moisture or air, their usable life would be shortened. (Photo by Rich Breunig)*



A Big Lift. *E-2C Hawkeyes will begin rolling off the production line in 1988 with new Allison turboprop engines. The new powerplants were tested on this aircraft last year at the Naval Air Test Center at Patuxent River, Maryland. (Photo by Jim Wagner)*

New Turboprop Engines To Give E-2C More Stamina

New Allison turboprop engines will be incorporated into Grumman/Navy E-2C production planes beginning next year. The first plane to have the new turboprops will be aircraft number 122, slated for delivery in February of 1988.

"The engines give us a substantial improvement in increased time on station and a better rate of climb for the added weight that the Hawkeye now carries," says John Michaelsen, E-2/C-2 engineering program director.

Prototypes of the engines were formally tested in Hawkeye #34 last July in a Naval Preliminary Evaluation at the Patuxent River Naval Air Station, Maryland. Flight testing of the prototypes ended in December.

The engines were then returned to Allison for update to production configuration. They are expected back at Grumman at the end of this month or early in April.

Once the engines are back in the aircraft and checked-out, Grumman will turn the plane over to the Naval Air Test Center at Patuxent River. The center will resume the Grumman-supported tests in May. The tests are expected to run until September.

Obituaries

Francis Struzinski of ILS Operations Support, Melville, Aircraft Systems Division, died February 1 at the age of 57. He had been with the company since 1963 and resided at 96 Locust Blvd., Lake Ronkonkoma, N.Y.

Irene Mahon of Classified Document Control, Bethpage, Aircraft Systems Division, died January 27 at the age of 58. She had been with the company since 1977 and resided at 17 Elm St., Hicksville, N.Y.

Ralph Miranda of Measurement Standards, Calverton, Aircraft Systems Division, died January 23 at the age of 55. He had been with the company since 1974 and resided at 410 Hillside Ave., West Sayville, N.Y.

Michael Maurer of Program Contracts, Bethpage, Aircraft Systems Division, died February 2 at the age of 53. He had been with the company since 1966 and resided at 70 Eastwood Blvd., Centereach, N.Y.

Mel C. Guerra of Welding, Tulare, Olson Division, died January 29 at the age of 34. He had been with the company since 1984 and resided at 663 North I. St., Tulare, California.

Personals

I would like to extend my sincere appreciation to my fellow co-workers and ESO for the beautiful flowers and their kind expressions of sympathy during the recent loss of my daughter. **George Iwanicki**

We would like to thank the Grumman family for its kind expressions of sympathy in the recent loss of our mother. **Victor and Mary Ann Albanese**

My family and I wish to thank all my co-workers and ESO for the beautiful flowers and their kind expressions of sympathy during the recent loss of my mother. **Lido Ghezzi**

The family of Al Struzinski wish to express their deepest thanks to everyone at Grumman for all their thoughtfulness at our time of sorrow. **Carol Fragas**

The family of Andy Maier wish to express our sincere thanks for the kindness and sympathy shown by co-workers and friends at the Product Development Center. We also thank you for the generous donations to the American Cancer Society. **John Maier**

My family and I wish to thank everyone for their kind expressions of sympathy during the recent loss of my mother Florence. **George Clark**

Retiree Obituaries

Joseph Aquanno of 1003 11th St., West Babylon, N.Y., died February 4, 1987. He retired in 1976.

Robert Austin of 11246 59th Ave. North, Seminole, Florida, died February 6, 1987. He retired in 1968.

Joseph E. Brooks of 314 Third St., Greenport, N.Y., died October 15, 1986. He retired in 1972.

Robert Bures of 3 Millford Dr., Central Islip, N.Y., died February 3, 1987. He retired in 1985.

Ottavio D'Angelo of 480 Windmeadows, Altamonte Springs, Florida, died January 24, 1987. He retired in 1969.

Nicholas L. Fasano of 12018 Greenway Cir., South Bldg., 18, Apt 204, Royal Palm Bch., Florida, died February 11, 1987. He retired in 1975.

Otto K. Hertel of 43 S. Jeffery St., Beverly Hills, Florida, died February 15, 1987. He retired in 1973.

Donald J. Mackinnon of 1 Kelly Rd., Lot #6, Vista La., Sturbridge, Massachusetts, died February 4, 1987. He retired in 1984.

Martin A. Nebel of 709A Wooton Ct., Lakehurst, New Jersey, died February 3, 1987. He retired in 1974.

Joseph C. O'Rourke of 27 Calabash Dr., Calabash, North Carolina, died February 16, 1987. He retired in 1960.

Viggo Pedersen of 5 Arch Dr., Box 263, East Hampton, Connecticut, died January 22, 1987. He retired in 1984.

Vincent Pepitone of 88 Beach Dr., Merrick, N.Y., died February 2, 1987. He retired in 1976.

Gregory Sherwin of 1114 W. Lewis St., San Diego, California, died February 19, 1987. He retired in 1978.

Chester J. Slaska of 377 Main St., Centerport, N.Y., died February 15, 1987. He retired in 1977.

Charles Sokol of 162 Cherry La., Floral Park, N.Y., died February 6, 1987. He retired in 1974.

Clyde W. Soper of 49 Anchor Ave., Oceanside, N.Y., died February 19, 1987. He retired in 1970.

Harry N. Stickle of 842 Mayer Dr., Wantagh, N.Y., died February 15, 1987. He retired in 1981.

James E. Wallis of 7501 E. Sundance Trl., Carefree, Arizona, died February 3, 1987. He retired in 1984.

Thomas F. Walsh of 25 Orchard Neck Rd., Center Moriches, N.Y., died January 30, 1987. He retired in 1979.

Richard J. Welsch of 37 Cornell St., Williston Park, N.Y., died November 7, 1986. He retired in 1977.

Bernard J. Bellew of 7300 20th St., Vero Beach, Florida, died January 26, 1987. He retired in 1982.

Helen M. Boyle of Star Rte. 1, Box 152, Spaulding Hill Rd., Owego, N.Y., died January 30, 1987. She retired in 1976.

Ray Bradenburg of 18 Boone St., Bethpage, N.Y., died January 28, 1987. He retired in 1975.

Harris S. Dayton of 19 Baylis Pl., Syosset, N.Y., died January 22, 1987. He retired in 1985.

William C. Donnelly at Box 390, East Quogue, N.Y., died January 31, 1987. He retired in 1977.

Ralph E. Frei of 199 Quaker Path, Stony Brook, N.Y., died January 19, 1987. He retired in 1984.

D. Ellsworth Johnson of 275 D South Blvd., Boynton Beach, Florida, died January 20, 1987. He retired in 1964.

Floyd J. Johnson of 934 Clay St., Baldwin, N.Y., died January 24, 1987. He retired in 1972.

John F. Klein of Star Route, Corinth, Vermont, died January 23, 1987. He retired in 1977.

Gerald A. Martin of 629 St. Lucie Cr., Stuart, Florida, died January 25, 1987. He retired in 1981.

John A. Munyak of 33 North St., Syosset, N.Y., died January 22, 1987. He retired in 1976.

John Shkira of 28-2 Winding Path, Manorville, N.Y., died January 25, 1987. He retired in 1976.

Adolph H. Tiedemann of 1216 Winston St., Norfolk, Virginia, died January 17, 1987. He retired in 1984.

Edwin C. Wright of 2 Janet Drive, Plainview, N.Y., died February 1, 1987. He retired in 1967.

Moved Off Campus

The Grumman team working on the Tokamak project at Princeton University has moved its offices to Plainsboro, New Jersey, Building 218 (the same building as Grumman's Tachonics Corporation). Their new address is: 107 Morgan Lane, Plainsboro, N.J. 08536-3026; telephone number is (609) 275-2675. Send mail to: P.O. Box 425, Plainsboro, N.J. 08536.

Travelers Travelin'

The Travelers Mass Marketing Department has moved from its East Meadow, Long Island, offices to Albany, New York. This move affects automobile and homeowner's insurance policy holders.

The new address is: The Travelers Insurance Company, Mass Marketing Department, 80 Wolf Road, Albany, N.Y. 12205.

To call this office, New York State residents can dial 1-800-342-9870. Out of state residents should call 518-454-4503, collect.

There will be *no change* in the locations or phone numbers of the Grumman customer services offices in Headquarters, Melville, Calverton or Great River.

Back To School

Grumman Data Systems Institute will be offering IBM personal computer software and CADD (computer-aided design and drafting) seminars throughout 1987.

Grummanites can receive a special discount on tuition for these seminars. For more information, call the Institute's Admission Department, 364-2055 in Nassau; 467-6690 in Suffolk.

Good Eating Habits

March is National Nutrition Month. This year's theme is "Good Nutrition: A Personal Choice." Literature is available in the Medical Department in corporate headquarters as well as in nurse's stations throughout the company.

As part of the month-long awareness program, Grumman Food Services plans to have a luncheon special on March 26 at all L.I. cafeterias and buffeterias. Brochures will also be distributed at that time.

For further information, call Grumman Medical Services, Ext. (111) 52101 or (516) 575-2101.

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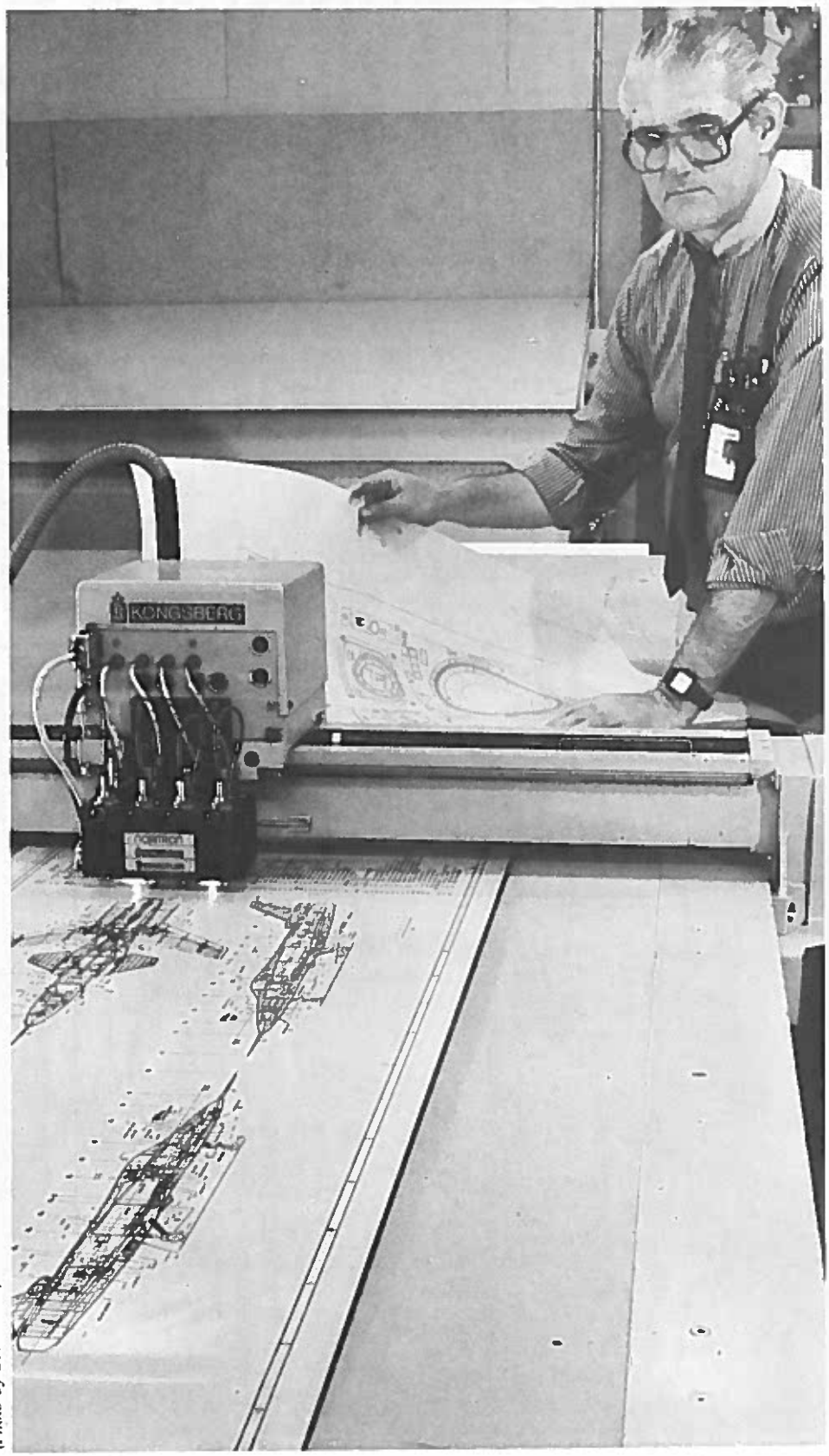

(Photo by Bob Settles)

The Fastest Draw In Town

A lot of design work is now done with a light pen on a computer monitor, so faster, more efficient ways are needed to print the designs. Grumman does that with a couple of Kongsberg Plotters.

What an engineer creates on the Grumman Engineering and Manufacturing System is transmitted directly to the Kongsberg through the main computers in Bethpage.

This is truly a paperless operation. All engineering drawings are done on Mylar, never paper, says Paul Berg, a senior layout draftsman. Paper expands and contracts too much. On Mylar, air pressure forces the ink through the pens because gravity couldn't make ink flow fast enough to keep up with the speed of the plotter.

The plotter can also scribe with knife blades on metal or polycarbonate. It's an important production tool. It can create templates, outline actual parts on raw material and create precise engineering drawings, all to an accuracy of five thousandths of an inch.

Berg and the other operators in Drafting Technology and Control monitor the output and can spot problems in drawings. The operators run two plotters in an environmentally controlled room in Building 35. This seven-year-old plotter and a newer, larger one run 20 out of 24 hours a day, usually six days a week. They are only stopped to clean the ink system.